

Just a subtle difference? Findings from a systematic review on definitions of nutrition literacy and food literacy

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Summary

Nutrition literacy and food literacy have become increasingly important concepts in health promotion. Researchers use one or the other term to describe the competencies needed to maintain a healthy diet. This systematic review examines whether these terms are synonymous or if their meanings are substantially different.

We searched major bibliographic databases (Web of Science, PubMed, ScienceDirect, CINAHL, SocIndex and ERIC) for publications that provided an original definition of nutrition or food literacy. Then we used Nutbeam's tripartite health literacy model as an analytical grid. The definitions we found included specific competencies, which we mapped to the domains of functional, interactive, or critical literacy.

In the 173 full-text publications we screened, we found six original definitions of nutrition literacy, and 13 original definitions of food literacy. Seven food literacy definitions were integrated into a conceptual framework. Analysing their structure revealed that nutrition literacy and food literacy are seen as specific forms of health literacy, and represent distinct but complementary concepts. Definitions of nutrition literacy mainly described the abilities necessary to obtain and understand nutrition information. Definitions of food literacy incorporated a broader spectrum of theoretical and practical knowledge and skills. To be food literate also means to apply information on food choices and critically reflect on the effect of food choice on personal health and on society. Since food literacy is based on a more comprehensive understanding of health behaviours, it is the more viable term to use in health promotion interventions. For the practical implication, a harmonization of the different definitions is desirable.

Key words: health literacy, food, nutrition, systematic review

INTRODUCTION

Given the central role of nutrition in health and chronic disease prevention, shaping dietary patterns is of particular importance for public health (Nishida *et al.*,

2004). Improving dietary habits of the population is a societal and multifaceted task, which demands an understanding of the social context, but also food related skills and abilities of individuals. In this regard,

nutritional science and education researchers are currently discussing the concepts of *nutrition literacy* and *food literacy*.

Today, researchers use one or the other term to describe the areas of competence upon which healthy dietary behaviour depends; i.e., ‘nutrition literacy’ (Spronk *et al.*, 2014), or ‘food literacy’ (Brooks and Begley, 2014; Vaitkeviciute *et al.*, 2015). So far, the terms are indistinct and each is defined variously and sometimes inconsistently (Vaitkeviciute *et al.*, 2015; Vidgen and Gallegos, 2014). Thus, it is hard to extract specific outcomes of health-promoting activities or interventions from the literature on either nutrition literacy or food literacy, or to choose appropriate and scientifically sound tools for measuring those outcomes.

In order to achieve conceptual clarity, this paper aims to identify the constituent elements of nutrition literacy and food literacy. This work will also help us identify important competencies covered by neither concept.

To create a structured overview of the definitions and competencies that nutrition and food literacy entail, Velardo (2015) recommends using the already established, and closely related, the concept of health literacy by Nutbeam. Nutbeam’s multicomponent concept of health literacy has gained increasing interest in health promotion. Health literacy encompasses several skills and competencies needed to make good decisions about health. The Nutbeam’s concept has been applied in different settings (Nutbeam, 2000, 2008), including the realms of diet, health, and nutrition education (St Leger, 2001; Thomson and Hoffman-Goetz, 2012). The concept describes three forms of health literacy: *functional*, *interactive* and *critical*. We base our work on the description of these forms by Smith *et al.* (2013):

Functional health literacy includes the ability to obtain, understand, and use factual health information. A secondary outcome of functional health literacy is that people know more about health issues.

Interactive health literacy includes the abilities to act and interact successfully to improve health, and to utilize different forms of communication to obtain, provide, and apply relevant health information. People with better interactive health literacy skills are more likely to be proactive agents in everyday health-related actions.

Critical health literacy includes the ability to critically assess and reflect on health information and advice. This includes understanding and recognizing the wider social determinants of health. Improved critical health literacy increases the likelihood that a person will interpret and relate health information in their social context.

Each form represents competencies that increase the awareness, motivation, and ability of individuals as they engage with individual, family, community, and society health issues (Nutbeam, 2000, 2008).

We created an analytical grid based on this model of functional, interactive, and critical health literacy to systematically review definitions of nutrition literacy and food literacy.

METHODS

Search strategy and inclusion criteria

A systematic search of the literature was performed by one researcher (CK) using the terms ‘food literacy’ and ‘nutrition literacy’. Databases were searched from the earliest data of coverage (1974) to 31 December 2014. (Figure 1 illustrates the literature search and review process).

We searched the following databases: Web of Science, PubMed, ScienceDirect, CINAHL (Ebsco), SocIndex (Ebsco) and ERIC (Ebsco). We identified additional publications (scientific reports, dissertations) by conducting a hand search of references in included publications.

All references were saved in EndNote version X6. Duplicates, indices, tables of contents, and publications not written in English, French, or German (formal inclusion criteria) were removed. We used poster abstracts and conference proceedings published in peer-reviewed journals for forward search by author name, but they were not considered as full text publications. Backward search was undertaken on the reference lists of retrieved articles and books by screening for the terms nutrition or food literacy in titles. The full text of the resulting 173 publications was screened for the terms nutrition literacy and food literacy. Once those terms were identified in the text, we included only publications that explained or defined nutrition literacy or food literacy. The publications we finally included in the review provided original definitions of nutrition or food literacy.

Data analysis

One researcher (CK) extracted, summarized, and tabulated the following key information from each publication that provided an explanation of nutrition or food literacy: author; publication year; explanation of the term nutrition or food literacy; and, cited references. Based on the summary table, two reviewers (KS, SB) independently reviewed each explanation the first author had identified and determined if they provided a concise definition, or a more comprehensive conceptual

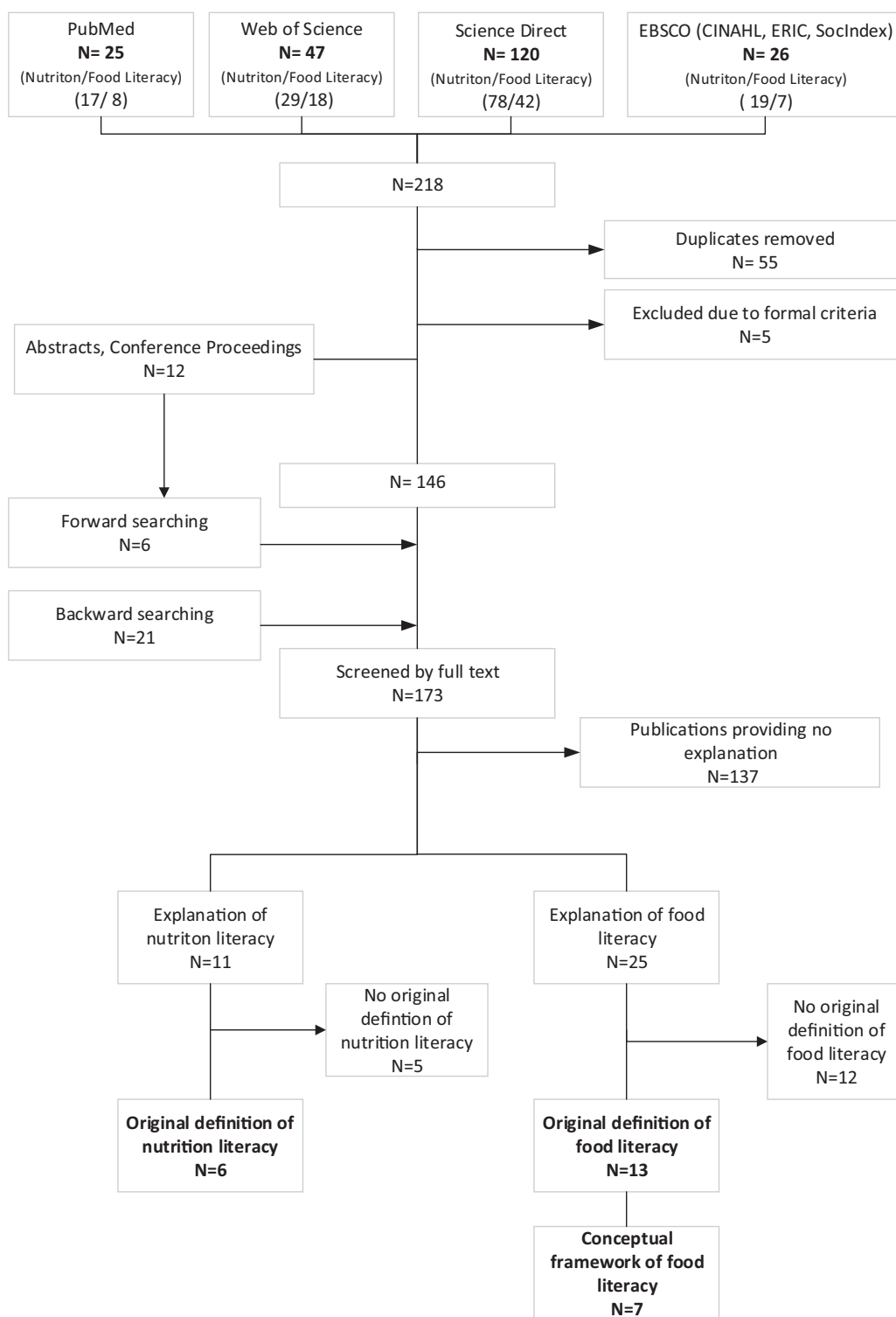


Fig. 1: Flowchart of the literature search and review process.

framework. An exact statement or description of the nature, scope, or meaning of nutrition literacy or food literacy qualified as a definition. If a publication referred to an existing definition of nutrition literacy or food literacy, we included only the definition from the original source. We defined a conceptual framework as a theoretical structure that explained key factors, variables, ideas, and presumed relationships of the concept. (Miles and Huberman, 1994). If publications contained a definition and a more detailed description of the associated competencies of nutrition or food literacy, and identified factors that influence the development of nutrition literacy or food literacy, or described the consequences of acquiring these competencies, we considered the publication to have a conceptual framework.

For our detailed analysis, we developed a matrix based on Nutbeam's forms of functional, interactive, and critical health literacy that included the skills and abilities named in Nutbeam's concept (see Introduction). Three authors (CK, KS, SB) independently assigned competencies specified in definitions and conceptual frameworks of nutrition literacy and food literacy to our analytical grid (see Appendix, Table A1). If definitions or conceptual frameworks referred directly to Nutbeam's forms of health literacy, we used the same assignment of competencies as the authors.

RESULTS

We identified 19 original definitions of nutrition literacy or food literacy (see Figure 1). For a detailed overview on definitions and conceptual frameworks of nutrition literacy and food literacy see Appendix, Tables A2–A4.

Definitions of nutrition literacy

Six publications presented an original definition (see Appendix, Table A2), but none provided a conceptual framework for nutrition literacy.

All definitions of nutrition literacy centered on an individual's cognitive capacities and strongly emphasized basic literacy and numeracy skills needed to understand and use information about nutrition. They argue that without these skills people cannot access and understand nutrition information and thus cannot build on nutritional knowledge, which is one of the keys to healthier eating practices. Only one definition (Guttersrud *et al.*, 2014) introduced more skills, namely, the ability to search and apply nutrition information and the ability to communicate and act upon this information in the broader social environment to address nutritional barriers in personal, social, and global perspectives.

Nutrition literacy was defined in the context of literacy surveys or studies (Blitstein and Evans, 2006; Watson *et al.*, 2013; Zoellner *et al.*, 2009) and research in nutrition education (Guttersrud *et al.*, 2014; Neuhauser *et al.*, 2007; Silk *et al.*, 2008). Definitions of nutrition literacy were linked directly to existing definitions or concepts of health literacy. Nutrition literacy was understood as a 'specific form of health literacy' (Blitstein and Evans, 2006), 'similar to health literacy' (Silk *et al.*, 2008), or 'health literacy applied to the field of nutrition' (Watson *et al.*, 2013). Four of the six definitions of nutrition literacy (Blitstein and Evans, 2006; Neuhauser *et al.*, 2007; Silk *et al.*, 2008; Zoellner *et al.*, 2009) adapted the U.S. Department of Health and Human Services definition of health literacy (National Research Council, 2004) by replacing the term 'health' with 'nutrition'. They defined nutrition literacy as an individual's capacity to obtain, process, and understand basic nutrition information necessary for making appropriate nutrition decisions.

The remaining two publications (Guttersrud *et al.*, 2014; Watson *et al.*, 2013) referred to either Nutbeam's (2000) or Pearson and Saunders (2009) definition of health literacy.

Assigning skills and abilities of nutrition literacy to functional, interactive and critical health literacy

Using the analytical grid, we found all definitions of nutrition literacy contained elements of functional health literacy. However, only one definition (Guttersrud *et al.*, 2014) described skills that could be assigned to interactive and critical literacy since this definition was based on Nutbeam's model of health literacy. Guttersrud *et al.* (2014) used the terms 'interactive' and 'critical nutrition literacy'. For a general overview, see Table 1.

Functional literacy

Definitions emphasized basic literacy and numeracy skills, including the ability to get and process nutrition information to improve decisions about nutrition. Only two definitions offered concrete examples of these skills; the ability to interpret front label packaging or menu labeling and the ability to understand basic nutrition concepts (Neuhauser *et al.*, 2007; Watson *et al.*, 2013).

Interactive & critical literacy

'Interactive nutrition literacy' was described as 'cognitive and interpersonal communication skills' which are, for example, needed to interact with nutrition counsellors. Moreover, interactive nutrition literacy was

Table 1: Nutrition literacy definitions with components of functional, interactive and critical (health) literacy

	Author, Year	Literacy Component		
		Functional	Interactive	Critical
Nutrition Literacy Definitions	Blitstein and Evans, 2006	X		
	Guttersrud et al., 2014	X	X	X
	Neuhauser et al., 2007	X		
	Silk et al., 2008	X		
	Watson et al., 2013	X		
	Zoellner et al., 2009	X		

described as an interest in searching for and applying nutrition information to improve personal nutritional status.

We identified two main aspects of critical nutrition literacy in Guttersrud *et al.*'s. (2014) definition: the ability to evaluate the quality of nutrition information; and the willingness to take action to improve nutritional health in families, communities, or broader social and global movements.

Definitions of food literacy

Thirteen publications introduced original definitions of food literacy. For a detailed overview, see Tables A3 and A4 in the Appendix. Six of these were conventional, but seven were integrated into a more comprehensive conceptual framework (Figure 1).

In contrast to definitions of nutrition literacy, definitions of food literacy focused not only on the ability to obtain, process, and understand basic information on food and nutrition, but named also the competence to apply this information. They highlighted skills in preparing food, emphasized the abilities and skills people need to make healthy food choices (Fordyce-Voorham, 2011) and to understand the effects of food choices on health, environment, and economy (Sustain, 2013; Thomas and Irwin, 2011).

Definitions of food literacy were provided by publications on nutrition education projects or interventions (Government of South Australia, 2010 cited by Pendergast *et al.*, 2011; Kolasa *et al.*, 2001; Sustain, 2013; Thomas and Irwin, 2011) and studies that explored the need for more nutrition education in schools (Fordyce-Voorham, 2011; Slater, 2013).

In contrast to definitions of nutrition literacy, which all referred to health literacy, only three out of the six definitions of food literacy referred to health literacy. Two definitions (Government of South Australia, 2010 cited by Pendergast *et al.*, 2011; Kolasa *et al.*, 2001) were adapted from the U.S. Department of Health and

Human Services definition of health literacy, by replacing 'health information' with 'food and nutrition information' and adding 'the competence to use this information'. Slater (2013) used Nutbeam's concept of health literacy, and described food literacy as a framework for a school food and nutrition curriculum. The remaining three definitions were not directly linked to health literacy by the authors.

Conceptual frameworks of food literacy

We identified seven conceptual frameworks of food literacy. For a detailed overview, see Table A4 in the Appendix.

Core elements of all conceptual frameworks included practical knowledge and skills to regulate food intake, including skills for planning meals, selecting, and preparing food. Most authors also emphasized some knowledge about nutrition (Block *et al.*, 2011; Desjardins and Azevedo, 2013; Howard and Brichta, 2013; Schnoegl *et al.*, 2006; Smith, 2009a; Topley, 2013), and the ability to understand and judge the impact of food and nutrition on personal and public health (Howard and Brichta, 2013; Schnoegl *et al.*, 2006; Smith, 2009a; Topley, 2013; Vidgen and Gallegos, 2014).

Most conceptual frameworks also highlighted the importance of attitudes, awareness, motivation, or concrete behaviour to act on knowledge and skills. Volitional and behavioural factors were either directly mentioned in the definitions (Block *et al.*, 2011; Howard and Brichta, 2013; Topley, 2013; Vidgen and Gallegos, 2014), or were described as important components or educational goals (Desjardins and Azevedo, 2013; Schnoegl *et al.*, 2006). The emphasis on food appreciation, and on feeling motivated to prepare healthy food (Desjardins and Azevedo, 2013; Schnoegl *et al.*, 2006), showed that cooking and eating were seen as enriching daily life (Schnoegl *et al.*, 2006; Topley, 2013) as well as increasing satisfaction, confidence, or resilience (Desjardins and Azevedo, 2013; Topley, 2013). Only

Smith (2009a) focused mainly on improving students' abilities and did not explicitly mentioned concrete behaviour.

All of the conceptual frameworks presented food literacy as an important factor in making healthy food choices, and a powerful resource for improving individual and public health.

Food literacy could create a pleasant and positive relationship with food (Block *et al.*, 2011; Desjardins and Azevedo, 2013; Vidgen and Gallegos, 2014). Food literacy may also encourage more self-determination, strengthen personal and public health and well-being, and reduce health costs (Block *et al.*, 2011; Schnoegl *et al.*, 2006; Vidgen and Gallegos, 2014). However, Vidgen and Gallegos (2014) noted that the link between food literacy and healthy nutrition is indirect. For them, food security and the ability to prepare food enhance choice and pleasure, which, in turn, can stimulate healthy eating behaviour.

Several authors saw food literacy as an important factor in a more equal (Schnoegl *et al.*, 2006; Smith, 2009a) and sustainable society (Smith, 2009a; Topley, 2013). Food literacy was described as a dynamic process (Vidgen and Gallegos, 2014), developed over a life course (Block *et al.*, 2011; Howard and Brichta, 2013; Schnoegl *et al.*, 2006). All but one conceptual framework (Smith, 2009a) highlighted contextual factors that influence the development or application of food literacy skills. The authors focused especially on social and cultural context, environmental, and legal factors (Block *et al.*, 2011; Desjardins and Azevedo, 2013; Howard and Brichta, 2013; Schnoegl *et al.*, 2006; Vidgen and Gallegos, 2014). Specific population groups, such as those with low numeracy skills, children, seniors, indigenous peoples, immigrants, and those of lower socioeconomic status, might have fewer food literacy skills (Howard and Brichta, 2013). Vidgen and Gallegos (2014) pointed out that food literacy skills are developed in context, and the constitution and meaning of these abilities may vary across individuals and cultures. Homeless or socioeconomically deprived people must plan and managing their food intake differently than financially secure people. The authors pointed out that food literacy is only one factor in household decision making, and should be seen in the broader context of food availability, policy, socialization, and marketing strategies (Block *et al.*, 2011; Schnoegl *et al.*, 2006).

Conceptual frameworks we identified were developed in the context of discussions or exploratory studies that focused on practical aspects of food literacy (Block *et al.*, 2011; Desjardins and Azevedo, 2013; Vidgen and Gallegos, 2014), projects that reviewed

current food programs and food literacy status (Howard and Brichta, 2013; Topley, 2013), and efforts to promote or implement food literacy in populations (Schnoegl *et al.*, 2006; Smith, 2009a).

The only group who did not link its conceptual framework of food literacy to health literacy was Schnoegl *et al.* (2006). Block *et al.* (2011) and Smith (2009a) directly built their conceptual frameworks on existing frameworks for health literacy. Others understood food literacy as a subset of health literacy (Howard and Brichta, 2013), or as a concept that emerged from it (Desjardins and Azevedo, 2013; Topley, 2013), or recognized that food literacy was consistent with health literacy (Vidgen and Gallegos, 2014).

Assigning skills and abilities of food literacy to functional, interactive, and critical health literacy

All definitions of food literacy, and every conceptual framework we identified described skills and abilities of functional health literacy.

One definition (Slater, 2013) and four conceptual frameworks (Desjardins and Azevedo, 2013; Smith, 2009a; Topley, 2013; Vidgen and Gallegos, 2014) considered competencies that are related to the skills covered by interactive health literacy. Abilities that demand critical evaluation and understanding were mentioned in all conceptual frameworks but one definition (Slater, 2013) of food literacy. For a general overview, see Table 2.

Functional literacy

Like definitions of nutrition literacy, definitions of food literacy highlighted skills needed to obtain and understand information about food and nutrition. However, general numeracy and literacy skills were only mentioned once. Only Desjardins and Azevedo (2013) mentioned the ability to access information.

All conceptual frameworks, and two definitions of food literacy (Sustain, 2013; Thomas and Irwin, 2011), put emphasis on increasing knowledge about nutrition and food. Food literacy frameworks gave a detailed description of these areas of knowledge. In total, we identified five major topics.

First, all conceptual frameworks emphasized procedural or practical knowledge necessary to making informed decisions and preparing food as a key element of food literacy. All frameworks and two definitions (Sustain, 2013; Thomas and Irwin, 2011) named the basic cooking skills required to prepare a fresh meal. Among other skills they named planning and budgeting for food (Desjardins and Azevedo, 2013; Howard and

Table 2: Food literacy definitions and conceptual frameworks with components of functional, interactive and critical (health) literacy

Food Literacy Definitions	Author, Year	Literacy Component		
		Functional	Interactive	Critical
Conceptual frameworks of Food Literacy	Fordyce Voorham, 2011	X		
	Kolasa et al., 2001	X		
	Eat well South Australia, 2010	X		
	Thomas and Irwin, 2011	X		
	Slater, 2013	X	X	X
	Sustain, 2013	X		X
	Schnoegl et al. 2006	X		X
	Vidgen and Gallegos, 2014	X	X	X
	Howard and Brichta, 2013	X		X
	Topley, 2013	X	X	X
	Desjardins and Azevedo, 2013	X	X	X
	Smith, 2009a	X	X	X
	Block et al. 2011	X		X

Brichta, 2013; Schnoegl *et al.*, 2006; Vidgen and Gallegos, 2014), and general shopping skills (Block *et al.*, 2011; Howard and Brichta, 2013; Thomas and Irwin, 2011), including the ability to choose high-quality food (Schnoegl *et al.*, 2006). They also listed respect for basic hygiene rules when storing and preparing food (Desjardins and Azevedo, 2013; Howard and Brichta, 2013; Sustain, 2013; Vidgen and Gallegos, 2014).

Second, all conceptual frameworks and one definition included (Sustain, 2013) knowledge about the origin of food, because the food system is increasingly complex. Knowing and understanding the steps along the food chain (production, processing, transport, purchase, and disposal) was understood to be important.

Third, all conceptual frameworks included as components of food literacy the ability to interpret nutritional facts, read food labels, judge the size of plates (Block *et al.*, 2011; Desjardins and Azevedo, 2013; Howard and Brichta, 2013; Smith, 2009a), as well as having a general understanding of food composition (Block *et al.*, 2011; Schnoegl *et al.*, 2006; Vidgen and Gallegos, 2014).

Fourth, five conceptual frameworks and one definition of food literacy included an understanding of the effect of food choice on health and well-being. Food literacy includes knowing which foods should be included in the daily diet for good health (EU 2006, Vidgen and Gallegos 2014, Smith 2009), and a general understanding of the effect of nutrition on one's personal health (Howard and Brichta, 2013; Sustain, 2013; Topley, 2013; Vidgen and Gallegos, 2014).

Fifth, three conceptual frameworks included culinary history and an understanding of the influence of social, cultural, historic, and religious factors on food choice and eating habits (Schnoegl *et al.*, 2006; Smith, 2009a; Topley, 2013).

Interactive literacy

Five publications of food literacy included skills and abilities assigned to interactive health literacy. Two of them used the term 'interactive food literacy', and directly referred to Nutbeam's concept of health literacy.

Slater's definition of 'interactive food literacy' is based on the presumption that knowledge about food and nutrition builds personal skills like decision-making and goal-setting, which then improve nutritional health and well-being (Slater, 2013). Smith (2009a) conceptual framework differentiates between several types of food literacy that have interactive elements, highlighting the following competencies: sharing life experience; empathizing with others ('lifeworld food literacy'); cooperative learning ('interactive/interpretive food literacy'); and, using storytelling and narratives to explore the meanings of food ('narrative food literacy'). We assigned three more aspects of food literacy ['join in and eat in a social way', (Vidgen and Gallegos, 2014), the ability 'to share information and transfer skills' (Desjardins and Azevedo, 2013) and 'creating community' (Topley, 2013)], to interactive health literacy.

Critical literacy

Two definitions and seven conceptual frameworks of food literacy described elements of the dimension of critical health literacy. We identified the following three areas: (i)

The ability to judge the quality of nutrition information; (ii) the ability to critically reflect on factors that influence dietary behaviour; and, (iii) the ability to recognize the effect of food and nutrition decisions on society.

First, people need sufficient knowledge and skills to judge or evaluate information about nutrition and food (Guttersrud *et al.*, 2014; Slater, 2013; Smith, 2009a; Topley, 2013; Vidgen and Gallegos, 2014). Specifically, they need the ability to interpret claims made in food marketing, advertising and in the media (Howard and Brichta, 2013; Schnoegl *et al.*, 2006), and to critically question advice especially the ability to judge the statements made by nutrition experts (Schnoegl *et al.*, 2006).

Second, food literacy frameworks mentioned critical reflection on factors that influence dietary behaviour. The authors described food choices and dietary behaviour as situational and influenced by various factors, so a food literate person must be able to understand and reflect on the effect of social, cultural, historic and religious factors on eating habits (Schnoegl *et al.*, 2006; Slater, 2013; Smith, 2009a; Topley, 2013). The authors also mentioned the need to recognize that situational factors, like the smell of food or the company of others, influence food choice (Desjardins and Azevedo, 2013; Smith, 2009a).

Third, food literacy demands that people recognize the effect of their personal food and nutrition decisions on society. Publications that address these competencies described the complex economic and social effects of individual food choice. Food literacy was seen as 'contributing toward the sustainable, democratic development of citizenship' (Schnoegl *et al.*, 2006). Food literacy enables an in-depth understanding of the effect of an individual's food choice on the environment and local communities, and helps people understand the ways their decisions about food affect social development (Schnoegl *et al.*, 2006; Slater, 2013; Smith, 2009a; Sustain, 2013; Topley, 2013). Smith (2009a) named 'examining the macro-food environment' as an important topic that should be taught in home economics classes, since it develops critical thinking skills and abilities that enable people to select food that supports the welfare and fair treatment of others, and that are sustainable. Slater (2013) also mentioned the will to advocate to improve nutritional health in families, communities, and broader social and global movements as part of the food literacy definition.

DISCUSSION

This review paper is to our knowledge the first to examine systematically the differences and constituents of

nutrition literacy and food literacy. Nutrition literacy and food literacy have coexisted in the literature while the borders between them were unclear. As a result, it has been difficult to measure the effects and comparing the efficacy of interventions focusing on nutrition literacy or food literacy. We thus tried to clarify the current uncertainties in the distinction between these terms and to examine the relationship between nutrition, food and health literacy.

Based on the results, we suggest to conceptualize nutrition literacy as a subset of food literacy and that both (nutrition literacy and food literacy) can be fruitfully framed as specific forms of the broader concept of health literacy.

Our analysis showed that nutrition literacy and food literacy are distinct but complementary concepts. The most obvious difference between nutrition literacy and food literacy is in the scope of skills and abilities they include. All but one definition of nutrition literacy (Guttersrud *et al.*, 2014) exclusively described basic literacy skills necessary to understanding and obtaining information about nutrition. We could not describe in detail nutrition literacy skills or the factors that influence their development because we could not identify a conceptual framework for nutrition literacy.

Food literacy, however, described a wide range of skills and was elaborated in more detail. It was the more commonly used term for discussing concrete applications, and better describes the range of different skills it encompasses.

Research in the field of food literacy is ongoing and continues to add to the understanding of the concept (Cullen *et al.*, 2015; Palumbo, 2016). Cullen *et al.* (2015) presented an integrated definition (see Appendix, Table A5) and framework for food literacy based on a review of food literacy definitions in grey and scientific literature.

We and Cullen *et al.* (2015) identified a similar set of elements of food literacy. Our intent, however, was not to present another new framework. Instead, we offer a more detailed overview of the single skills and abilities that comprise nutrition literacy and food literacy in order to support health promotion researchers and practitioners in the design of study instruments and education programs. Our analytical grid enabled us, for example, to show that only four conceptual frameworks of food literacy included skills such as sharing information and interacting with others (Desjardins and Azevedo, 2013; Topley, 2013; Vidgen and Gallegos, 2014).

The ability to exchange information on food and nutrition with family, peers, and experts or to extract

information from different sources of communication grows in importance along with the amount of nutrition-related information from different sources. We recommend that future definitions and conceptual frameworks include more communicative or interactive skills.

In summary, skills described in nutrition literacy might represent a prerequisite for competencies described in food literacy, but they do not cover the whole range of skills and competencies people need if they are to make healthy and responsible nutrition and food decisions. This interpretation is supported by Smith (2009b), who argued that food literacy is a more powerful concept than nutrition literacy for guiding nutrition education, since food literacy addresses 'skills that people really need' (Smith, 2009b). A further strength of food literacy is that it integrates volitional and behavioural factors, namely awareness, attitudes, and motivation. These are crucial factors in implementing knowledge and practical skills in everyday life and are thus particularly important for health promotion practice (Contento, 2008).

Given the similarities between nutrition literacy, food literacy, and health literacy, we observed that nutrition literacy and food literacy are forms of health literacy, rather than freestanding concepts. Most authors linked their definitions of nutrition literacy and food literacy, and their conceptual frameworks to health literacy. Every definition of nutrition literacy and half of the food literacy definitions were based on an existing definition of health literacy. In their conceptual frameworks, the authors described food literacy as either a subset of (Howard and Brichta, 2013), based on (Block *et al.*, 2011), or having emerged from (Desjardins and Azevedo, 2013) or as linked to health literacy (Smith, 2009a; Topley, 2013).

We also found that components of functional, interactive and critical health literacy are reflected in nutrition literacy and food literacy definitions. All publications listed skills that we identified as elements of functional health literacy. Either basic skills people need to get and understand nutrition information (nutrition literacy) or the importance of knowledge about different food and nutrition topics (food literacy) were named. Nutbeam considered knowledge as a secondary outcome, rather than a fixed component in functional health literacy (Nutbeam, 2000). However, Nutbeam's model was adapted in newer models of health literacy that integrate knowledge about health into health literacy (Paakkari and Paakkari, 2012; Schulz and Nakamoto, 2005). These newer models also distinguish

between theoretical and practical knowledge as do conceptual frameworks of food literacy.

Interactive skills were described less often than functional skills. Only six of 19 publications mentioned interactive skills. We recognized that authors mentioned different aspects of interactive literacy even when directly referring to Nutbeam's concept. Interactive nutrition literacy highlights communication and information-seeking skills (Guttersrud *et al.*, 2014) while interactive food literacy highlights decision-making and goal-setting (Slater, 2013; Smith, 2009a). Finally, all conceptual frameworks showed elements of critical health literacy and highlighted the links between socially responsible eating and decisions about nutrition, and the need to understand the wider context of food production, and its impact on the environment and the economy. These authors reprise the debate over the meaning of health literacy, where social determinants of health and questions of empowerment are hotly debated. (Freedman *et al.*, 2009; Nutbeam, 2000).

Others have recently begun differentiate the forms of health literacy by discussing applications and contents in specific contexts, such as mental health literacy, cancer literacy, and e-health literacy (Diviani and Schulz, 2012; Massey *et al.*, 2012; Velardo, 2015).

Indeed, health literacy is a very broad concept, which must be concretely applied (operationalized) to promote health (Abel and Sommerhalder, 2015).

Health literacy comprises different skills and abilities. In the specific context in which we discuss, someone with a basic understanding of nutrition information, who is nutrition literate, is not necessarily food literate. Likewise, a food literate person is not necessarily health literate in its broader definition. To advance the application of the concept of health literacy in nutritional interventions we suggest adopting food literacy as the single well defined term that encompasses the whole realm of competencies covered previously in two separate definitions. We argue that nutrition literacy should be folded into food literacy and that both can be seen as specific forms of health literacy. Fig A6 in the Appendix provides a visualization of this multilayered understanding. Further research in the area of literacy might tell us if other health literacy forms (e.g. physical activity literacy) could possibly be understood as constituent parts of an individual's overall health literacy.

Strengths and limitations

Our study was strengthened by its systematic approach to literature search and analysis. Our backward and forward search on abstracts and reference helped us

identify articles not listed in scientific databases. Five of the seven conceptual frameworks were drawn from grey literature sources. We may have missed other grey literature on nutrition literacy and food literacy because references to these publications are hard to retrieve, and also hard to access (Francois *et al.*, 2014).

Our study was also strengthened by our analytical grid, which we based on Nutbeam's widely accepted concept.

Several authors of nutrition literacy and food literacy definitions and conceptual frameworks referred to Nutbeam's model of functional, interactive and critical health literacy. His concept has been used as an analytical grid in several studies and is recommended to map different skills and abilities (Velardo, 2015). The grid allowed us to sort and analyse elements of nutrition literacy and food literacy definitions and conceptual frameworks. We could thus identify even rarely mentioned aspects of definitions, including interactive elements of nutrition literacy and food literacy. Although it is likely that another health literacy model that considers dimensions like cultural literacy (Zarcadoolas *et al.*, 2005) or media literacy (Manganello, 2008) would make a difference in the number or kind of classifications for the components of nutrition literacy and food literacy, but we do not think it would have changed our conclusion that food literacy is the more comprehensive term.

Future research

Regarding the major role of food in daily life and its importance in the development of chronic diseases, we believe that food literacy, as a specific form of health literacy can significantly contribute to guide future health promotion activities focusing on dietary behaviour.

Our analysis suggests that more research on interactive skills is needed since they are so far under-discussed in food literacy. Future research on food literacy should also explore the prominent role played by attitudes, motivation, and behaviour. The role of these factors is currently under debate in health literacy research and not all definitions of health literacy consider them to be integrated. Recently, Sorensen *et al.* (2012) presented an integrative model of health literacy that explicitly names as an important component the motivation to knowledge and competencies. We also identified this as an important component of food literacy. Since an understanding of the link or a possible pathway between different health literacy skills, motivational factors, and concrete health behaviour is still missing, we would encourage further research in this field.

Moreover, quantitative data on food literacy is lacking and more empirical support is necessary to demonstrate that food literacy is an important prerequisite for health and well-being. There are a few instruments that measure nutrition literacy (Diamond, 2007; Gibbs and Chapman-Novakofski, 2013; Guttersrud *et al.*, 2014), and fewer that assess food literacy (we found these latter only in the grey literature). Thus, we will need new instruments that measure all of the aspects of food literacy, and consider as well concepts like self-efficacy and attitudes towards healthy food.

CONCLUSION

We offer conceptual clarification on the competing terms nutrition literacy and food literacy. We have shown that both nutrition literacy and food literacy are specific forms of health literacy. Our structured analysis of nutrition literacy and food literacy definitions shows that there is more than a subtle difference between them. Nutrition literacy focuses mainly on abilities to understand nutrition information, which can be seen as a prerequisite for a wider range of skills described under the term food literacy. Thus, nutrition literacy can be seen a subset of food literacy. We suggest using the term food literacy instead of nutrition literacy to describe the wide range of skills needed for a healthy and responsible nutrition behaviour. When measuring food literacy, we suggest the following core abilities and skills be taken into account: reading, understanding, and judging the quality of information; gathering and exchanging knowledge related to food and nutrition themes; practical skills like shopping and preparing food; and critically reflecting on factors that influence personal choices about food, and understanding the impact of those choices on society.

SUPPLEMENTARY MATERIAL

Supplementary material is available at Health Promotion International online.

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